

INCH-POUND

MIL-PRF-39022E
AMENDMENT 4
13 January 1997
SUPERSEDING
AMENDMENT 3
27 December 1993

PERFORMANCE SPECIFICATION

CAPACITORS, FIXED, METALLIZED, PAPER-PLASTIC FILM, OR PLASTIC FILM DIELECTRIC, DIRECT AND ALTERNATING CURRENT, (HERMETICALLY SEALED IN METAL OR CERAMIC CASES), ESTABLISHED RELIABILITY, GENERAL SPECIFICATION FOR

This amendment forms a part of MIL-PRF-39022E, dated 18 January 1991, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 3

3.2, delete and substitute:

"3.2 Qualification. Capacitors furnished under this specification shall be products which are qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.4 and 6.3). In addition, the manufacturer shall obtain certification from the qualifying activity that the reliability assurance requirements of 4.1.1 have been met and are being maintained. Authorized distributors which are approved to MIL-STD-790 distributor requirements by the qualified product list (QPL) manufacturers are listed in the QPL."

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3.3.2.2, delete and substitute:

"3.3.2.2 Quality levels. The quality of lots that have been subject to and passed the subgroup 1, 100 percent screening inspection of the group A inspection shall be established and maintained in accordance with 4.4.4.2 and EIA-554, method B. Individual PPM defect level (i.e., PPM-2 and PPM-3) and an overall PPM defect level (i.e., PPM-5) shall be established based on the tests prescribed in the subgroup 2 tests of the group A inspections. The defect level for PPM-2 shall be less than 100 PPM. The implementation of PPM verification shall be 12 months from the date of this specification."

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Following 3.5.3.1, add:

"3.5.3.2 Tin plated finishes. Tin plating is prohibited as a final finish or as an undercoat. Tin-lead (Sn-Pb) finishes are acceptable provided that the minimum lead content is 3 percent (see 6.11)."

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3.14, title, delete and substitute:

"3.14 Barometric pressure (reduced) for qualification only."

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4.5, following group C test requirements paragraph, add:

"In the event that no production occurred during the reporting period, a report shall be submitted certifying that the manufacturer still has the capabilities and facilities necessary to produce the item. The manufacturer, however, must maintain the required number of unit hours in the specified maintenance period in order to remain qualified to the applicable failure rate levels. The manufacturer must also produce enough parts during any reporting period in order to perform all applicable group C tests."

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4.6.1.1, delete and substitute:

"4.6.1.1 Inspection and production lot.

"4.6.1.1.1 Inspection lot. An inspection lot shall consist of all capacitors from the same production line or lines, of one or more styles, one or more voltage ratings and the same dielectric, not less than the minimum numbers of dielectric layers 3, and offered for inspection during a single work week. Each lot shall be kept separate from every other lot. The sample units selected from a lot shall be representative of the styles, capacitance values, and case sizes in the lot. All sample units belonging to a lot shall be identified by means of a code symbol (either letters or numbers, at the option of the manufacturer). The following styles may be combined for quality conformance and FR level maintenance (all voltage ratings may be combined):

Group		Styles
1	-	CHR09, CHR12, and CHR19.
2	-	CHR49.
3	-	CHR59.

"4.6.1.1.2 Production lot. A production lot shall consist of capacitors of the same style, voltage rating and nominal capacitance value. Manufacture of all parts in the lot shall have been started, processed, assembled, and tested as a group. Lot identity shall be maintained throughout the manufacturing cycle."

* 4.6.1.2.1, line 6; delete "1,000 megohms" and substitute "100 megohms".

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TABLE IV, delete and substitute:

"TABLE IV. Group A inspection.

* Inspection	* Requirement * paragraph	* Test * method * paragraph	* Sampling procedure	*
* <u>Subgroup 1</u>	*	*	*	*
*Burn-in - - - - -	* 3.6	* 4.7.2	* S) ,	*
*Radiographic inspection	*	*	* *	*
* x-ray <u>1</u> / - - - - -	* 3.7	* 4.7.6	* *	*
*Thermal shock <u>2</u> / - - - - -	* 3.8	* 4.7.4	* *	*
*Seal - - - - -	* 3.9	* 4.7.5	* *	*
*Dielectric withstanding * voltage - - - - -	* 3.10	* 4.7.6	* *	*
*Insulation resistance * (at 25° C) - - - - -	* 3.11	* 4.7.7	* * 100% inspection	*
*Capacitance - - - - -	* 3.12	* 4.7.8	* *	*
*Dissipation factor - - -	* 3.13	* 4.7.9	* *	*
*	*	*	* S) -	*
* <u>Subgroup 2</u> (PPM)	*	*	*	*
*Insulation resistance at * 25° C (PPM-2) - - - - -	* 3.11	* 4.7.7	* S) ,	*
*Capacitance (PPM-2) - - -	* 3.12	* 4.7.8	* * See	*
*Dissipation factor (PPM-2)	* 3.13	* 4.7.9	* * table V	*
*Mechanical examination * (PPM-3) (dimensions * only)- - - - -	* 3.4	* 4.7.1	* 13 samples * 0 failures	*
*	*	*	*	*
* <u>Subgroup 3</u>	*	*	*	*
*Visual inspection	*	*	*	*
* External	* 3.4, 3.5	* 4.7.1	* S) ,	*
* Marking <u>3</u> / - - - - -	* 3.28	* 4.7.1	* * 13 samples	*
* Workmanship - - - - -	* 3.29	* 4.7.1	* S) - 0 failures	*
*	*	*	*	*
* <u>Subgroup 4</u>	*	*	*	*
*Solderability - - - - -	* 3.18	* 4.7.14	* 5 samples * 0 failures	*
*	*	*	*	*

1/ Not required for styles CHR29, CHR49, CHR20, through CHR25.

2/ Ten cycles, minimum (CHR01A, CHR01B, CHR01D, CHR01E, CHR01G, CHR01H, CHR01K, CHR01L, CHR01N, and CHR01P). Five cycles, minimum (CHR01C, CHR01F, CHR01J, CHR01M, and CHR01R).

3/ Marking defects are based on visual inspection and shall be charged only for illegible, incomplete, or incorrect marking. Any subsequent electrical defects shall not be used as a basis for determining marking defects."

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TABLE V, delete and substitute:

"TABLE V. Sampling plans for PPM categories.

Lot size	Sample size PPM-2
1 - 13	100%
14 - 125	100%
126 - 150	125
151 - 280	125
281 - 500	125
501 - 1,200	125
1,201 - 3,200	125
3,201 - 10,000	192
10,001 - 35,000	294
35,001 - 150,000	294
150,000 - 500,000	345
500,001 - UP	435

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TABLE VI, delete and substitute:

"TABLE VI. Group C inspection.

* Test	* Requirement * paragraph	* Method * paragraph	* Number of * sample units * for inspection	* Allowable * failures	*
* <u>Subgroup 1 (every 2 months)</u>	*	*	*	*	*
* <u>(FR levels M, P, R, and S)</u>	*	*	*	*	*
* <u>Subgroup 1A</u>	*	*	*	*	*
*Vibration -----	* 3.15	*4.7.11	*S),	*S),	*
*Salt spray (corrosion) <u>5</u> / - -	* 3.16	*4.7.12	* * 12 <u>1</u> /	* *	*
*Immersion <u>5</u> / -----	* 3.17	*4.7.13	* *	* *	*
*	*	*	*S) -	* *	*
* <u>Subgroup 1B</u>	*	*	*S),	* *	*
*Shock (specified pulse) - -	* 3.19	*4.7.15	* *	* *	*
*Resistance to soldering	*	*	* * 10 <u>1</u> /	* * 1	*
* heat <u>5</u> / -----	* 3.20	*4.7.16	* *	* *	*
*Moisture resistance <u>5</u> / - - -	* 3.21	*4.7.17	* *	* *	*
*	*	*	*S) -	* *	*
* <u>Subgroup 1C</u>	*	*	*S),	* *	*
*Terminal strength <u>5</u> / - - - -	* 3.22	*4.7.18	* *	* *	*
*Low temperature and	*	*	* *	* *	*
* capacitance change with	*	*	* * 12 <u>1</u> /	* *	*
* temperature -----	* 3.23	*4.7.19	* *	* *	*
*Resistance to solvents <u>5</u> / - -	* 3.25	*4.7.21	* *	* *	*
*	*	*	*S) -	*S) -	*

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"TABLE VI. Group C inspection - Continued.

* * * Test	* * * Requirement * paragraph	* * * Method * paragraph	* * * Number of * sample units * for inspection	* * * Allowable * failures	* * *
* <u>Subgroup 2 (every 2 months)</u>	*	*	*	*	*
* <u>(FR levels M, P, R, and S</u>	*	*	*	*	*
* <u>not applicable to CHR01</u>	*	*	*	*	*
* <u>styles)</u>	*	*	*	*	*
* * Insulation resistance (at	*	*	*	*	*
* applicable maximum rated	*	*	*S),	*S),	*
* temperature) - - - - -	* 3.11	*4.7.7	* *10 per lot	* * <u>2/</u>	*
* Life (extended) - - - - -	* 3.26	*4.7.22.2.1	* *minimum	* *	*
* * <u>Subgroup 3 (every month)</u>	*	*	*S) -	*S) -	*
* <u>Subgroup 3A</u>	*	*	*	*	*
* (All FR levels for CHR01	*	*	*	*	*
* styles)	*	*	*	*	*
* Capacitance change with	*	*	*S),	*S),	*
* temperature - - - - -	* 3.23	*4.7.19	* *5 per style	* * <u>2/</u>	*
* Life - - - - -	* 3.26	*4.7.22.2.1	* *minimum	* *	*
* * <u>Subgroup 3B</u>	*	*	*S) -	*S) -	*
* (CHR01A, CHR01D, CHR01G,	*	*	*	*	*
* CHR01K, and CHR01N)	*	*	*S),	*S),	*
* AC life (240 hours)- - - -	* 3.26	*4.7.22.4	* *	* *	*
* Dissipation factor - - - -	* 3.13	*4.7.9	* * <u>3/</u>	* * <u>4/</u>	*
* Insulation resistance - - -	* 3.11	*4.7.7	*S) -	*S) -	*

1/ Six samples for styles CHR01A, CHR01D, CHR01G, CHR01K, and CHR01N.

2/ See MIL-STD-690 for number of failures permitted.

3/ The number is at the option of the manufacturer; the total capacitance of the sample units to be tested shall equal 40 µF, unless otherwise specified (see 3.1).

4/ For reference only; data will be submitted to qualifying activity.

5/ If the manufacturer can demonstrate that this test has been performed five consecutive times with zero failure, this test, with the approval of the qualifying activity, can be deleted. The manufacturer, however, shall perform this test every 3 years after the deletion as part of long term design verification. If the design, material, construction processing of the part is changed, or if there are any quality problems, the qualifying activity may require resumption of the specified testing. Deletion of testing does not relieve the manufacturer from meeting the test requirements in case of dispute."

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4.7.10, title, delete and substitute:

"4.7.10 Barometric pressure (reduced) for qualification only."

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Following 6.10, add:

"6.11 Tin plated finishes. Tin plating is prohibited (see 3.5.3.2) since it may result in tin whisker growth. Tin whisker growth could adversely affect the operation of electronic equipment systems. For additional information on this matter, refer to ASTM B545 (Standard Specification for Electrodeposited Coating of Tin)."

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notation. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

CONCLUDING MATERIAL

Custodians:

Army - CR

Navy - EC

Air Force - 85

Preparing activity:

DLA - CC

(Project 5910-1929)

Review activities:

Army - AR

Navy - AS, CG, MC, OS, SH

Air Force - 19